

## A New and Unusual Species of Stephanidae (Hymenoptera), with a Discussion on its Phylogenetic Implications

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**Abstract.**—*Megischus basalis* sp. n. is described from male specimens collected in Guatemala and misidentified in the literature as *M. annulator* Brullé. The new taxon is incompatible with all genus-level schemes proposed in the literature and is tentatively interpreted as the most basal species of the *Megischus*-complex, immediately apical to *Stephanus* s. s., representing an entirely new step to be considered in the phylogeny of the family. The new taxon illustrates the difficult interpretation of aberrant stephanid species, suggesting that such taxa should not be assigned to new genera without a formal cladistic analysis.

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The Stephanidae are one of the smallest families of Hymenoptera, with 326 valid species worldwide (Aguiar 2004b). Thus, it is perhaps surprising that the corresponding literature is permeated with increasingly dissident opinions about its genus-level classification (e.g., Schletterer 1889, Enderlein 1905 and 1906, Elliott 1922, Ceballos 1926, Townes 1949, Orfila 1956, Benoit 1951, DeSantis 1980, Achterberg 2002). There is a varying number of genera recognized, and each of them is often differently delimited by each author. This situation indicates that a rigorous cladistic analysis of the family is urgently needed.

Examination of stephanid specimens for a distinct study (Aguiar 2004a), revealed a remarkable undescribed species of key importance to the phylogenetic interpretation of the family. The aim of the present work is to name and describe this new taxon, discussing the phylogenetic implications of its unusual morphology for the phylogeny of the family.

Morphological terminology and generic concepts follow Aguiar (2001). For the phylogenetic discussion, data from Aguiar (2000) was compared with *Megischus ba-*

*salis* sp. n., *Protostephanus ashmeadi* Cockerell (examined; extinct), *Electrostephanus neovenatus* Aguiar and Janzen (examined; extinct), and *E. brevicornis* Brues (literature data; extinct). Drawings were prepared by Gláucia Marconato, under the author's supervision.

### *Megischus basalis* Aguiar, new species (Figs 1–10)

*Megischus annulator* Brullé (part): Cameron 1887: 419; ♂ pl. 18, fig. 7, ♂ pl. 18, fig. 8. Listed, male description, distribution record, figure.

**Type material.**—3 ♂♂, corresponding to the specimens described by Cameron (1887). Holotype (BMNH) from Guatemala: "S. Geronimo, Guatemala. Champion.", "1", "P. Cameron Coll., 1914–110.", "OSUC0022919" (barcode, plastic). Conditions: antennae, except left scape and pedicel, front tarsi and most of remaining tarsomeres, lost; wings partially destroyed; covered by some dirt and fungi. Paratypes 2 ♂♂ (BMNH) Guatemala: "S. Geronimo, Guatemala, Champion.", "P. Cameron Coll., 1914–110.", "OSUC0022917" (barcode, plastic). Conditions: antennae, front and mid legs, and all wings, lost. "San Geronimo, Vera Paz. Champion.", "B. C. A.

Hymeno.I., *Megischus annulator* Brullé.", "OSUC 0022918" (barcode, plastic). Conditions: antennae, left tibia and tarsi, and left wings, lost.

*Description*.—Male. *Head*: Frons strongly transverse rugose ventrally, then suddenly longitudinally rugose dorso-laterally. Vertex glabrous, with 3–4 concentric interocellar carinae; irregularly rugose behind them; antero-laterally strongly longitudinally rugose, changing to uniformly and transversely rugose centrally and posteriorly, including post-vertex, and reaching occipital carina (Fig. 1). Temples and gena polished, smooth; gena projected laterally, forming a conspicuous callosity (Fig. 1). Occipital carina dorsally narrow or linear, becoming moderately wide laterally, and then again narrow ventrally; apically with each side reaching, but not touching, the hypostomal carina, then curving outwards and extending briefly along it. Hypostomal carina linear, not forming a flange. *Mesosoma*: Pronotum short, colo slightly longer than semiannular; anterior margin uplifted and slightly turned backwards, distinctly emarginate, but concavity not deeper than wide (Fig. 3). Colo dorsally without, or with an inconspicuous depression dorso-centrally; about 4 complete carinae plus some 4 other incomplete, all regular looking, none wide or leaf-like (Figs 2–3). Pronotal fold indistinct, its position indicated by the semiannular, which raises suddenly (in lateral view, with a distinct step between these structures) (Fig. 2). Preannular not differentiated. Femoral sulcus entirely distinct and well-marked, subcrenulate or distinctly crenulate (Fig. 2). Ventral area distinctly longitudinally striate (Fig. 2). Semiannular latero-centrally mostly smooth, with several very small punctures, dorsally, and laterally in front of the pronotal lobe, strongly transversely rugose (Figs 2–3). Prosternum with a distinct depression centrally subapically; mostly polished, smooth, but with medium-sized shallow punctures and micropunctures, both more frequent toward

the external margin of each hemisternite; apex and latero-basal angles rugulose. Mesepisternum covered with sparse shallow foveolation and micropunctures; polished, smooth between foveae; dorsal part distinctly transversely striate; pilosity sparse, associated with foveolae, but dense, delicate pilosity on dorsal part. Mesopseudosternum glabrous, perfectly polished, smooth; discrimen distinctly and entirely foveolate. Hind coxa with delicate sculpture and hairs; dorsally finely transversely rugulose, with a small microreticulate area dorso-laterally; ventrally mostly polished, smooth; mesally alutaceous and with longer and more dense pilosity. Hind femur glabrous, except for hairs on apex of each ventral tooth or tubercle; entirely coarsely alutaceous, matt; with two to several conspicuous denticles basad of central tooth, which is placed beyond the middle. Hind tibia posteriorly very slightly compressed centrally, forming a small callosity; otherwise simple, straight; ventro-longitudinal carina differentiated along compressed part only, although advancing a little over dilated part. Hind basitarsus cylindric, elongate; fourth tarsomere with ventral side greatly projected, almost reaching apex of fifth tarsomere. Propodeum centro-longitudinally transversely striate, laterally, including flanks, more finely, irregularly and obliquely striate, in some parts changing to rugose or rugulose; also with some small areolations, particularly on the sides of the centro-longitudinal strigation (Fig. 5). Parapetolar depression shallow and mostly polished, smooth, with 1–2 transverse subcrenulations or incomplete carina. Spiracular groove not defined, entirely absent, or inconspicuously indicated by 1–2 short longitudinal rugosities (Fig. 5). Interfoveolar and postfoveolar areas distinctly transversely carinate or crenulate; pleuropropodeal fovea not clearly delimited; postfoveolar area continuous with metasternum, and distinctly projected ventrally over the base of mid coxa, form-

ing a lobe (Fig. 4). Metapleuron dorsally and ventrally mostly or entirely polished, smooth; laterally coarsely and subtransversely rugose, with sparse long hairs but without pruinosity. *Wings*: venation intermediate between that of *Stephanus* and *Schlettererius*, as follows. Front wing (Fig. 9) with a long parastigma, vein 1M distinctly arched, 2r unusually short, and 2-1A apical half nebulous. Hind wing (Fig. 10) with anterior and posterior folding lines distinct; veins Sc+R and M+Cu basally tubular; remaining of M+Cu, and all of 1M, 1r-m, 1Rsb, 2M, and Cua nebulous; Cua forwardly oblique; veins 1Rsb and 2M ending near wing margin; vein 1M longer than Cua. Three apical hamuli. *Metasoma*: Petiole wide,  $4.0\times$  as long as maximum dorsal width (Fig. 6); dorsally, at base, rugose (Fig. 7), then transversely rugulose, changing to almost polished, smooth apically; shape characteristic, very large at base and largest at point of articulation with second tergite, its apical margin straight (Fig. 8); changing from cylindrical basally to somewhat flattened apically; spiracular tubercles distinctly visible from above, situated distinctly basad of middle (Fig. 6). Remaining tergites polished, smooth, but second tergite basally with strong rugosity (Fig. 8). *Coloration*: Body, including head, dark brown; malar space with a distinct yellow spot; front and mid legs brown with reddish or yellowish hue; apex of hind femur, hind tibia entirely, or at least its dilated part, and hind tarsus, light brown or amber yellow. Front and hind wing membrane amber yellow, veins brown.

*Female*.—Unknown.

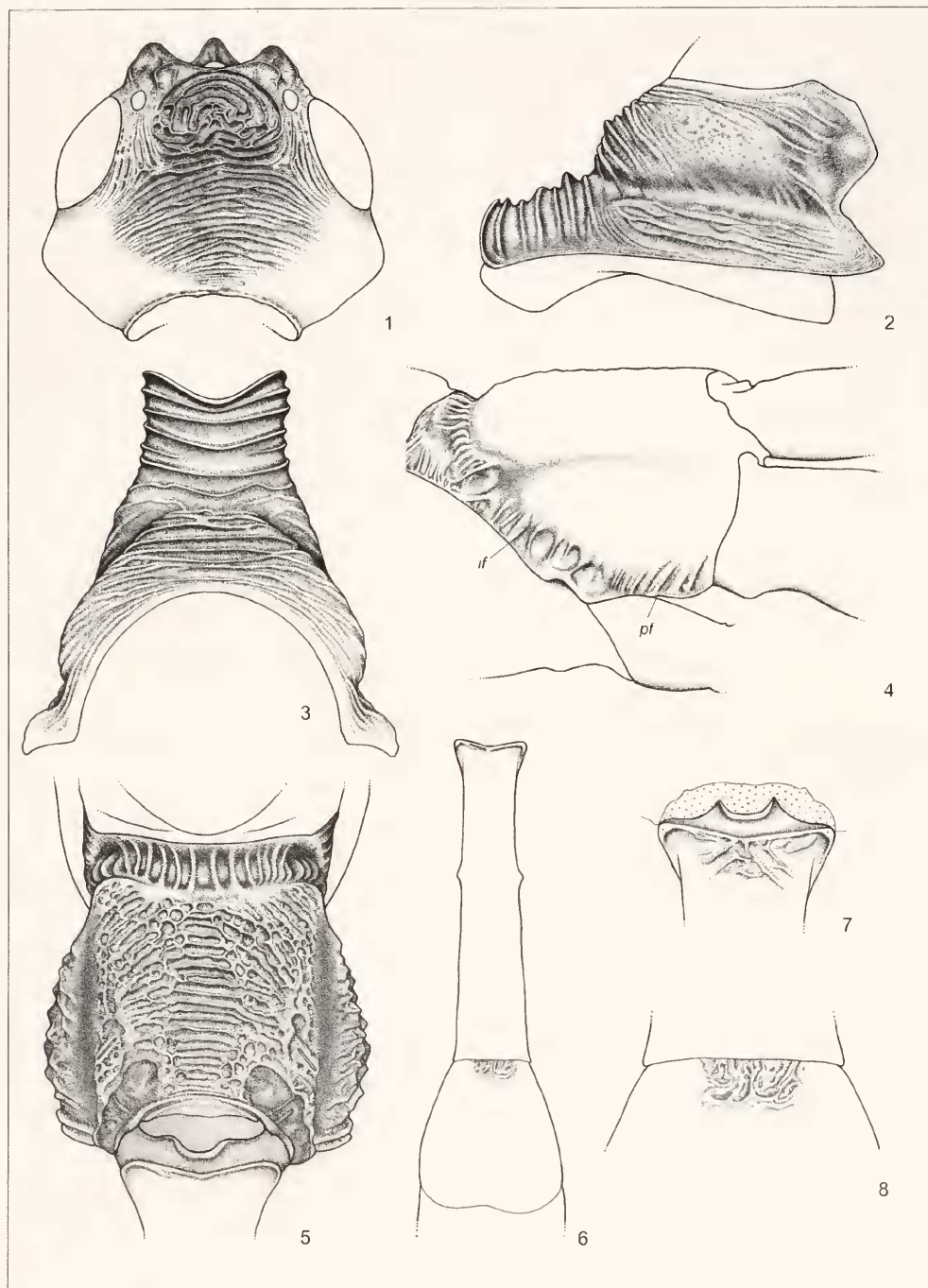
*Comments*.—The type specimens of the present species were originally described by Cameron (1887) as the male of *M. annulator* Brullé, 1846, now a junior synonym of *M. furcatus* (Lepeletier and Serville, 1825). Although not discussed by Cameron, the respective female was also illustrated, and its front and hind wing venation, head and metasoma indicate it

represents a typical *Megischus*, possibly *M. furcatus*. The male specimens, however, belong to a very distinct species, clearly isolated from all other American Stephanidae, including *M. furcatus*, a valid species for which the male is well known. *Megischus basalis* sp. n. is easily separated from all other American species by the overall structure of pronotum, preannular area absent, hind wing vein 1M remarkably long, hind wing vein Cua defined, nebulous, inclined toward wing apex, propodeum strongly striate centrally to areolate laterally, hind femur glabrous, entirely and strongly alutaceous, hind tibia light brown or yellowish, petiole shape unique, especially by unusually wide base and apex, and by the second metasomal tergite basally with strong rugosities, smooth otherwise. The overall head sculpture, with a central, a latero-longitudinal and a postero-transversal pattern, is also characteristic.

The types of *M. annulator* Brullé were not examined, but its original description mentions that, in the metasoma, “le deuxième segment est luisant et offre tout au plus une ou deux rides à la base” (second metasomal tergite shining, at most with one or two wrinkles basally); this is similar to what is observed in *M. basalis* sp. n., but the basal rugosity is much stronger for the latter (Fig. 7). Brullé (1846) also mentions, in the same description, a “métathorax parsemé de quelques gros points, ridé en arrière et un peu au milieu” (propodeum with some large foveae, wrinkled behind and a little centrally), decidedly unlike the dominant and complex striate-areolate pattern, without isolated foveae, covering the entire propodeum of the examined specimens (Fig. 5). Moreover, the above features of *annulator* fit well the condition observed for both sexes of *M. furcatus*.

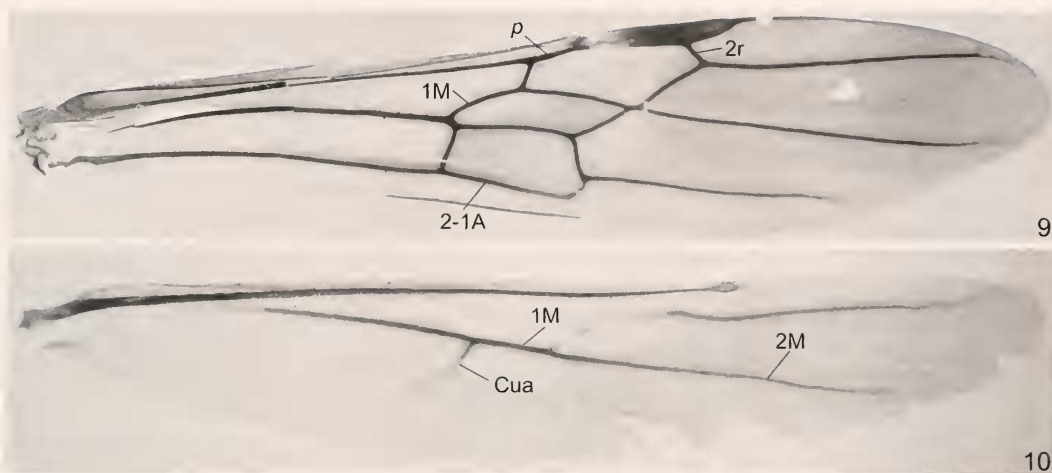
*Distribution*.—Guatemala.

*Discussion*.—Although known only from males, which in Stephanidae are not as characteristic or informative as females,



Figs. 1–8. *Megischus basalis* Aguiar, new species. Holotype ♂. 1, Head, dorsal. 2, Pronotum, left. 3, Pronotum, dorsal. 4, Interfoveolar (if) and post-foveolar (pf) areas, left. 5, Propodeum, dorsal. 6, First and second metasomal tergites. 7, First metasomal tergite basally. 8, Second metasomal tergite basally, detail. Drawings by Gláucia Marconato.





Figs. 9–10. *Megischus basalis* Aguiar, new species. Holotype ♂. 9, Front wing (*p* is the parastigma). 10, Hind wing. Illustrations not to scale.

*M. basalis* sp. n. displays an important combination of features which, taken together, may challenge definitions for some supraspecific taxa of the family. First, it displays features which are at the same time typical of *Schlettererius* (gena protruded, small eyes, pronotal fold absent, petiole smooth, front wing crossvein 2r very short, vein 1M arched, and hind wing venation well developed, with a distinct Cua) and *Stephanus* (pronotal structure, front wing parastigma very long, vein 2-1A nebulous only apically, hind coxa without a meso-dorsal tooth, moderately long petiole, and its tergite and sternite completely fused), suggesting that *M. basalis* could be an intermediate taxon between these two genera, and therefore basal to *Megischus*. However, *M. basalis* also shows features which are characteristic of *Megischus*, or of other more derived taxa, such as an elaborate propodeal structure and sculpturing, and the hind tibia narrowed basally and dilated apically. When further combined with a hind coxa as long as, or slightly longer than maximum length of mesepisternum, and the petiole distinctly longer than second metasomal tergite, *M. basalis* is also easily isolated from the extinct *Protostephanus* Cock-

erell and *Electrostephanus* Brues s. s. Finally, *M. basalis* also does not show any of the presumed synapomorphies for *Hemistephanus* or more derived groups, either as defined by Aguiar (1998, 2001) or Achterberg (2002).

Thus, evidence support *M. basalis* as one of the oldest existing stephanids. However, while it lacks most of the derived features of *Megischus*, it does have a few of them, which is enough to indicate a next evolutionary step in relation to *Schlettererius* and *Stephanus*. Therefore, it is reasonable to assume that *M. basalis* is, in fact, an intermediate form between *Stephanus* and *Megischus*, representing an entirely new step to be considered in phylogenetic interpretations of the family. Its current placement in *Megischus* is based on the fact that if *Stephanus* is expanded to include some of the derived features of *Megischus* (i.e., those present in *M. basalis*), then these genera would become close enough to be synonymized, a clearly unstable taxonomic decision at this point.

Withal, *M. basalis* also shows unique features in Stephanidae, such as the second metasomal tergite basally strongly rugulose (Figs 6, 8), the complex structure of the inter- and post-foveolar areas (Fig. 4),

and, in particular, the hind wing with an unusually long vein 1M (Fig. 9). If compared to results in Aguiar (2000), the following features can also be recovered as likely apomorphies for *M. basalis*: frons with downwardly inclined hairs; vertex sculpturing transverse and parallel; colo with central depression; pronotal fold indistinct; vellum of antenna cleaner apically somewhat lobed; only 2 simple, and 1 hook-shaped hamuli; mesepisternum between mid coxae glabrous or nearly so; post-foveolar area not aligned with inter-foveolar area; and hind coxa and femur with minute decumbent hairs, which are much shorter than length of basal femoral tooth.

Although evidence suggests that *M. basalis* could perhaps be assigned to a new genus, it must first be considered that aberrant species in the family are, in fact, not uncommon, with extreme forms occurring even within limited areas throughout the world. This is further worsened by the fact that establishing even basic relationships of such "oddballs" with other stephanids is often an arduous task. Thus, while erecting new genera from such taxa is easy, it is not necessarily enlightening, and might expand the degree of confusion between genus-level definitions.

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